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ABSTRACT

The purpose of this study was to examine current attitudes and knowledge of pre-service teachers towards assistive technology and to develop, implement, and evaluate a mini-workshop on assistive technology to better prepare regular classroom teachers for the inclusive classroom. A pre-post survey design was used. Data from the pre-survey provided demographic information as well as documenting current attitudes and knowledge. Participants were 168 students enrolled in a computer applications course for elementary teachers. A mini-workshop on assistive technology was presented by experts in the field. Data was analyzed to determine impact of the mini-workshop on attitude and knowledge and to detect differences based on completion of a diversity course, having a disabled family member and having a disabled friend. Results indicated a continued need to include assistive technology under the broader umbrella of technology in teacher preparation programs. (Author)

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Preparing Teachers for the Inclusive Classroom: A Preliminary Study of Attitudes and Knowledge of Assistive Technology

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Abstract

The purpose of this study was to examine current attitudes and knowledge of pre-service teachers towards assistive technology and to develop, implement, and evaluate a mini-workshop on assistive technology to better prepare regular classroom teachers for the inclusive classroom. A pre-post survey design was used. Data from the pre-survey provided demographic information as well as documenting current attitudes and knowledge. Participants were 168 students enrolled in a computer applications course for elementary teachers. A mini-workshop on assistive technology was presented by experts in the field. Data was analyzed to determine impact of the mini-workshop on attitude and knowledge and to detect differences based on completion of a diversity course, having a disabled family member and having a disabled friend. Results indicated a continued need to include assistive technology under the broader umbrella of technology in teacher preparation programs.

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Introduction

During the past decade, the demand for technology literate teachers has increased dramatically. Both the government and the public support the need for excellence and equity in technology integration, though, funding opportunities to support technology related professional development have focused on the in-service teacher. Technology experiences for pre-service teachers have centered around one basic class, usually computer based, and limited modeling by a few innovative methods instructors. The content of the basic course, too frequently, focused heavily on computer skills and minimally on integration of technology. Little if any reference was made to assistive technology and appropriate application in the regular classroom.

This paper presents the results of a preliminary study to evaluate the use of a mini-workshop on assistive technology presented by special education experts intended to assist pre-service teachers in developing an awareness of the variety of assistive technologies available and the teacher's role in using these devices or equipment in the regular classroom.

Background and Purpose

Mention the word technology to someone today and the first thing that comes to mind is computers and the World Wide Web. However, when it comes to education, that is too narrow of definition. In teacher preparation programs, students used to be required to take a media class that addressed a variety of technologies from 16mm films to overhead projectors to computers. Because of the technological advances in the past ten years, these classes have evolved to where the primary focus is currently on computer use and curriculum integration. Students have little exposure to other effective and appropriate technologies that can be used in the regular classroom to promote and enhance teaching and learning. One major category of technologies has been virtually ignored, assistive technology.

First, it would seem appropriate to provide a definition of assistive technology or AT. The following definition appeared in the Technology-related Assistance for Individuals with Disabilities Act of 1988 or the Tech Act (P.L.100-407) and has been adopted in the Individuals with Disabilities Education Act (IDEA, 1990). Assistive technology is "any item, piece of equipment or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities." [20 U.S.C. Chapter 33, Section 1401 (25)]. As you can see, this definition is broad and can encompass a range of devices from low technology to high technology items as well as software. It certainly expands the interpretation of technology beyond the computer to include even simple tools that can be used to enhance learning for all individuals.

The 1997 reauthorization of the Individuals with Disabilities Education Act (IDEA) mandated that students with disabilities learn and be evaluated with their peers (Goldberg, 1999; Derer, Lewis, & Rieth, 1996; Lewis, 1998). With this mandate, more school districts are implementing inclusion of students with disabilities into the

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regular classroom. This in turn has created greater need for awareness of instructional methods and assistive devices to help these students become a productive member of the classroom with a minimum amount of disruption.

Previous research in the area of assistive technology and teacher preparation appears to be very limited (Derer, Polsgrove & Rieth, 1996). There was discussion of the needs in this area and some suggestions as to how to address this need, however, very few of the articles reflected an actual implementation of in-service and pre-service training in assistive technology for administrators, teacher and other school personnel. For example Bryant, Erin, Lock, Allan and Resta (1998) discussed the need for higher education faculty responsible for special education teacher preparation programs to explore ways to better prepare teachers to work with students using assistive technology devices but did not address this same need for "regular" classroom teachers.

In the inclusive classroom, assistive technology can provide support for both students and teachers (Mebler, Hadaian & Ulman, 1999). However, in order for this to happen both the student and the teacher must understand and know how to use the devices. Planning and policy at all levels, (classroom, school and district) are essential to achieve this.

It appears that regular classroom teachers are not currently receiving knowledge and skills related to assistive technology. One way to address this need is at the pre-service or teacher preparation level. The International Society for Technology in Education (ISTE) is the professional education organization responsible for recommending guidelines for accreditation to National Council for Accreditation of Teacher Education (NCATE) for programs in educational computing and technology teacher preparation. Included in the recommended foundations in technology for all teachers are two standards that point to the need for assistive technologies to be included in the teacher preparation program. First, beginning teachers should be able to "plan and participate in activities that encourage lifelong learning and promote equitable, ethical, and legal use of computer/technology resources" (ISTE, I.B). In addition, they should be able to "demonstrate awareness of resources for adaptive assistive devices for student with special needs" (ISTE, I.B.5).

The ISTE foundation standards guide the activities and instruction in the Applications of Technology in Elementary Education Course. This is an undergraduate teacher preparation class that engages the student in the use of technology as an educational tool. Opportunity is provided for students to explore and utilize technology applications that enhance the teaching and learning process. Emphasis is placed on the design, development and delivery of effective communication and learning activities. Until fall, 1999, the standard related to assistive technology was not addressed. This study looks at an effort to assist pre-service teachers in achieving an awareness of assistive technology, the appropriate application of AT in the regular classroom, and the role of the classroom teacher in using assistive technology to enhance teaching and learning for all students.

Purpose

Very little supporting research for the incorporation of assistive technologies into the teacher preparation program for regular classroom teachers was found in a review of the literature. Therefore, a decision was made to conduct a preliminary study to determine the students' knowledge of and attitudes toward assistive technology.

The purpose of this study was three-fold. First, researchers were interested in identifying pre-service teachers current knowledge of and attitude toward assistive technology. If the ISTE standard related to assistive technology is to be achieved, than a knowledge of current status related to this standard must be assessed to establish baseline data. Second, it was important to assess the impact of a mini-workshop on both knowledge and attitudes. Similar to the majority of pre-service method classes, time restraints and current curricula needs in the Computer Application class restricted the amount of time that could be allotted to this topic. There was a need to discover if the mini-workshop approach would be an effective means to assist students in achieving the minimum standard related to assistive technology. Last, instruments and procedures needed to be evaluated for their potential use in future studies. The inclusion of assistive technology into the pre-service teacher education program was a much-neglected area of study. Both instruments and procedures that are valid and reliable needed to be developed to further this field of study.

Methodology

A pre-post test design was used for this study. The class instructor conducted survey administration. At the beginning of the class period, participants were asked to complete the pre-survey. After surveys were collected, two experts in the field conducted a mini-workshop on assistive technology. A diverse sampling of assistive technologies were presented and discussed. Students had the opportunity to interact with the technologies shown and to ask questions of the two experts. The entire time allotment for both the pre-survey data collection and the mini-workshop was approximately 80 minutes. Within two weeks during another class period, students were asked to complete the post-survey.

Mini-workshop

The mini-workshop began with a review of the definitions of assistive technology and the Tech Act. Various low and high tech devices were shown, demonstrated when applicable, and applications for specific disabilities were identified. The students then had the opportunity to handle and explore the various devices. Other options for assistive technology were briefly reviewed. Emphasis was placed on the role and responsibility of classroom teachers to make their classroom accessible. Assistive technology can provide the means for accessibility for some children with disabilities. Students had the opportunity to ask questions throughout the workshop and were encouraged to talk with the presenters individually and examine the technology in more detail at the conclusion of the workshop.

Instrument

The instrument used for this study was adapted from an instrument with known validity and reliability previously used by one of the researchers. While the original instrument was not appropriate for use in these circumstances, it did provide guidance in the selection of items to include that addressed attitude and knowledge related to assistive technology. Using this instrument as a guide, a special education professional and an educational technology professional worked together to develop a 20-question survey for this study. A total of 20 questions were designed to measure students' knowledge of and attitudes toward assistive technology and students with disabilities. A six-item Likert scale from strongly disagree to strongly agree was used as a response set. In addition to the 20 Likert scale items, the survey included demographic items to describe the population. Three additional variables were also investigated. They were:

1. Completion of a required course on diversity,
2. Having a family member who is disabled,
3. Having a close friend who is disabled.

Both professionals reviewed the instrument and both contributed to revisions to insure content validity. Once data was collected, a reliability analysis was conducted. Using all 20 items on the survey, the instrument had a reliability coefficient of .71 using the Guttman split-half. To somewhat control for the short length of the instrument reliability was recomputed using a split-half corrected by Spearman-Brown prophecy formula resulting in a reliability coefficient of .72. This was still in the low range but of some value as this was a preliminary study and the instrument was only being used for group measurement and not individual measurement. Reliability results indicated that before further data is collected revisions should be made in the survey instrument to improve reliability.

Participants

A convenience sample was used for this preliminary study. Participants in this study were the students enrolled in a Computers Application for Elementary Teachers class during the 1999-2000 school year. There were five sections of this class each of the two semesters. A pre-post design was used. One hundred sixty eight students completed the pre-survey; 154 students responded to the post-survey.

Information collected on the pre-survey was used to describe the participants. The majority of them were female(85%), juniors (78%), and 20-21(72%) years of age with an age range from 19 to 44 years. Almost three-quarters (73.1%) had completed the diversity class. About one-fourth had a family member who was disabled (24%). Similarly, approximately one-fourth had a friend who was disabled (23%).

Results

Data were analyzed three ways. First pre-survey frequencies were reviewed to identify current attitude and knowledge and to identify areas of concern. Second, post-survey responses were analyzed to see if the same areas of concern held true after participants completed the mini-workshop. Finally comparisons in mean scores were used to detect differences between pre and post as well as differences in current attitudes and knowledge based on independent variables: diversity class, disabled friend, and disabled family member.

Pre-Survey

Pre-survey data was used to measure current knowledge of and attitudes toward assistive technology. Starred items reflect negatively worded items or items where a negative response was desirable. For purposes of analysis and to simplify comparisons, all negatively worded items were recoded to reflect agreement level. However, actual frequencies were presented in all tables. A 25% level of disagree was set by the researcher to identify areas of concern.

There were ten items included to measure attitudes toward assistive technology and special needs students. Out of the ten attitude items, five were above a 75% agreement level. All children have the same need for praise and

disabled children strive as hard as others received the highest agreement ratings of 97% agree a little to strongly agree.

Five areas of concern were identified. The statement "disabled children are more self-confident than other children" received the lowest agreement rating. Eighty-nine percent indicated that they disagreed a little to strongly disagreed with this statement. Seventy-one percent disagreed a little to strongly disagreed with the statement "there should not be special schools for disabled children". Additionally, 47% disagreed a little to strongly disagreed that disabled children should compete with others; 36% disagreed a little to strongly disagreed that children will not be uncomfortable with disabled children; and 33% disagreed a little to strongly disagreed with the statement "most disabled children do not feel sorry for themselves".

Responses to the ten knowledge questions were generally positive. Nine of the knowledge items received agreement ratings of over 92% agreed a little to strongly agreed. Ninety-nine percent agreed a little to strongly agreed that assistive technologies could enhance the learning of disabled children. No response was low enough to identified an area of concern. However, the lowest agreement (76% agreed a little to strongly agreed) was with the statement "assistive technologies are (not) all high-tech".

Post-survey Response:

Similar to the pre-survey responses, five attitude items received agreement ratings of over 80% agreed slightly to strongly agreed. Rank order of items based on agreement ratings were almost identical when comparing post-survey frequencies to pre-survey frequencies. However, most responses received higher ratings. Significant differences will be discussed in the next section, comparisons.

All ten knowledge items received agreement ratings of over 89% agreed slightly to strongly agreed on the post-survey. Rank order items were very similar to those from the pre-survey. The most notable change was from 76% agreed slightly to strongly agreed on the pre-survey to 90% on the post-survey that assistive technologies are not al high-tech.

Comparisons

Overall attitude and knowledge scores for both pre and post-surveys were computed. Negative items were recoded and then a sum of responses to the ten items in each category was computed. This provided an overall attitude score and an overall knowledge score for comparison purposes. An alpha level of <.05 was used to determine significance.

The pre-survey attitude and knowledge scores were compared to detect any differences in mean scores. T-values were computed to identify any statistically significant differences. No change was detected in attitude scores, but results indicated significantly higher post-survey knowledge scores (t=4.857, p<.001).

Table 1: Change in Attitude and Knowledge, Comparison of Pre-survey and Post-survey overall scores.

		N	Mean	SD	t-value	Significance
Attitude						
	Pre	168	41.80	4.41	1.047	.296
	Post	154	42.35	4.93		
Knowledge*						
	Pre	168	49.91	4.63	4.857	<.001
	Post	154	52.56	5.15		

**Significance <.05*

Data from the pre-survey was used to examine overall attitude and knowledge based on the three independent variables diversity class (Table 2), disabled family member (Table 3), and disabled friend (Table 4). It was hypothesized that those students who had completed the diversity class and those students who had either a disabled friend or family member would have a higher overall score on attitude and knowledge. Thus, a one-tailed test of significance was used.

Students who had completed the class on diversity had a higher overall attitude score, but a lower overall knowledge score. However, no statistically significant differences were detected based on this sample.

Table 2: Comparison Of Current Attitude And Knowledge Based On Completion Of Diversity Class

		N	Mean	SD	t-value	Significance
Attitude						
	Yes	122	42.01	4.33	.904	.184
	No	45	41.31	4.66		
Knowledge						
	Yes	122	49.67	4.74	1.264	.104
	No	45	50.69	4.22		

**Significance <.05*

Attitudes of those with a disabled family member did not appear to be much different than attitudes of those without a disabled family member. As expected, overall knowledge scores were higher for those with a disabled family member. However, on neither attitude nor knowledge were the differences statistically significant.

Table 3: Comparison Of Current Attitude And Knowledge Based On Having a Disabled Family Member

		N	**Mean**	**SD**	**t-value**	**Significance**
Attitude						
	Yes	40	41.28	3.88	.868	.194
	No	128	41.97	4.56		
Knowledge						
	Yes	40	50.85	4.84	1.476	.071
	No	128	49.62	4.54		

**Significance <.05*

On both attitude and knowledge, those having a disabled friend scored higher. A statistically significant difference was detected on attitude based on having a disabled friend.

Table 4: Comparison Of Current Attitude And Knowledge Based On Having a Disabled Friend

		N	**Mean**	**SD**	**t-value**	**Significance**
Attitude*						
	Yes	39	43.03	4.48	1.911	.029
	No	128	41.53	4.21		
Knowledge						
	Yes	39	50.21	5.02	.471	.319
	No	128	49.80	4.54		

**Significance <.05*

Discussion

This study attempted to look at three areas: current attitude and knowledge, impact of mini-workshop, and assessment instruments and procedures. Discussion will be organized around these three themes concluding with a discussion of future research plans in this area.

Current Attitude and Knowledge

Data from pre-survey responses were used to determine current pre-service teachers' attitudes toward students with special needs and knowledge about assistive technology. Attitudes were very positive. It is felt that this may not be so much a factor of teacher preparation programs but relates to students' personal schooling experiences and general social attitudes. This could also be a result of the age and sex of participants. Participants in this study were predominately traditional female college students with an average age of 21.3. If there had been a larger population of older, non-traditional students and more male elementary pre-service teachers, we could have examined differences in attitudes based on age and sex.

While recognizing that attitudes are difficult to change, there were, however, some areas of concern that need to be addressed in the teacher preparation program. The participants in this study will be, for the most part,

traditional classroom teachers and not special education teachers. It was surprising to find that almost three-fourths felt that there should be special schools for students. It is difficult to determine participants reasoning and perspectives on this without further investigation.

Perhaps more troubling was the fact that over one third felt that children in a traditional classroom would be uncomfortable with a disabled child and that disabled children feel sorry for themselves. These attitudes still persist even with today's strong focus on acceptance of diversity.

We had expected that students who had already taken the required class on diversity would have a more positive attitude toward disabled children and would have more knowledge of IDEA and assistive technology. This did not prove to be the case with this sample. The content of this course has changed with the emphasis on diversity and perhaps other issues have replaced the previous inclusion of topics related to special needs populations.

Analysis of the fall semester data had indicated differences in attitude based on having a disabled family member. This difference was not detected with the full sample. In both semesters, approximately the same percentage of participants indicated that they had a disabled family member, so this probably did not account for the change. Future research will be needed in this area including identification of the relationship of the disabled family member to explore this area in more detail.

Knowledge responses were also surprisingly positive. Students appeared to have at least an awareness of assistive technology. However, it must be cautioned that this positive response could be misleading. As the survey was self-report, students may have been marking what they felt was the expected response and therefor responses are not representative of actual knowledge.

Impact of Mini-workshop

Because of time restraints and an already overloaded curriculum, only one class period could be devoted to the presentation of assistive technologies. This short, one-time exposure was not enough to make a difference in attitudes. This was expected as attitudes tend to be firmly entrenched and difficult to change even with multiple exposures.

The mini-workshop was effective in changing knowledge. However, there are several variables at work here. It is not possible at this time to determine if this change was a factor of the technologies displayed or of the instructor. Participants were exposed to and had the opportunity to handle a variety of "toys". It is possible that this actual hands-on approach was the largest contributor to the changes in knowledge detected. A team of special education instructors presented all of the mini-workshops. How much of the change was a factor of the specialization and/or personality of the presenters needs to be examined in future research.

Instruments and Procedures

While the instrument did show to be valid and reliable, changes should be made to improve both reliability and usability. The number of items needs to be increased to improve reliability. In addition, though the original survey adapted for use in this study included negatively worded items it is felt that these items adversely affected both student responses and reliability of the instrument and should be revised prior to future use.

Future Directions

This preliminary study supports the need for the inclusion of assistive technology in the preparation of teachers. Our efforts in investigating the best way to provide this content will continue.

First, the instrument will be revised based on the results of this study. Negatively worded items will be replaced with positive statements. Attitudes will continue to be part of the pre-survey but will be eliminated from the post survey as it is difficult to impact a change on attitudes. The number of knowledge items will be increased and reworded to more closely reflect the content of the mini-workshop. The format of the knowledge items will be revised from a Likert response set to a multiple choice format that supports the overall expected competencies related to assistive technologies.

Second, the workshop be varied. A quasi-experimental design will be used to examine factors impacting change on knowledge. Experimental groups will be used to examine the impact of both the hands-on use of the technologies and the instructors. In addition, the creation of software for self-study of assistive technology is being explored.

While this preliminary study was not without limitations, it proved useful on several levels. Both individual course planning and program planning will benefit from the results of this study. The technology for teachers class and the required diversity class will be reviewed for content and the addition of assistive technology components that prepare teachers for their role in adapting the regular classroom for special needs children. Within programs, emphasis on the integration of technology, including assistive technology, across the teacher preparation program will increase.

This study was successful in building collaboration between special education and technology programs. This sets the stage for planning and funding of technology needs within the college and established a framework for

further collaborative research between these two programs. It also serves as a model for technology collaboration with other programs, departments, and colleges strengthening the technology integration across programs that is essential for the preparation of technology literate teachers.

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